

**National Aeronautics and Space Administration
Washington, DC**

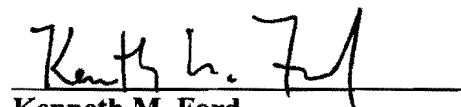
NASA ADVISORY COUNCIL

May 5-6, 2011

**Glenn Research Center
Ohio Aerospace Institute
Cleveland, Ohio**

MEETING MINUTES


P. Diane Rausch
Executive Director


Kenneth M. Ford
Chair

**NASA ADVISORY COUNCIL
Glenn Research Center
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*Meeting Report prepared by
David J. Frankel, Consultant
P B Frankel, LLC*

MINUTES

Thursday, May 5, 2011

Call to Order, Announcements

Ms. Diane Rausch, Executive Director, NASA Advisory Council (NAC or Council), called the meeting to order and welcomed the NAC members and attendees to the Ohio Aerospace Institute in Cleveland, Ohio. She stated that the NAC is a Federal advisory committee established under the Federal Advisory Committee Act (FACA). The meeting is open to the public. A dial-in teleconference capability is also being made available at this meeting for members of the public to listen to the meeting. Meeting minutes will be taken by Mr. David Frankel and will be posted to the NAC web site, www.nasa.gov/offices/nac, soon after the meeting. Each NAC member has been appointed by the NASA Administrator, Mr. Charles F. Bolden, Jr., based on the member's expertise. Each member is a Special Government Employee, subject to ethics regulations, and must recuse himself or herself from discussions on any topic in which there could be a potential conflict of interest. All presentations will be part of the public record.

Remarks by Council Chair

Ms. Rausch introduced Dr. Kenneth Ford, Council Chair. Dr. Ford welcomed everyone to the public meeting of the NAC. This is the seventh meeting since the Council first met in October 2009. The last meeting was at NASA Headquarters (HQ) in Washington, DC, on the eve of the rollout of the FY 2012 President's Budget. At that meeting, Mr. Bolden was able to spend quality time with the Council at both its dinner and meeting. The Council is pleased to be holding its current meeting in Cleveland, the location of NASA's Glenn Research Center (GRC). Yesterday, the Council toured several of NASA Glenn's outstanding research facilities.

Dr. Ford reminded everyone that the Council is a Federal advisory committee reporting directly to the NASA Administrator, providing advice and recommendations across the full-breadth of the U.S. civil space program. He noted that two Council members, Mr. Robert Hanisee (Chair of the Audit, Finance and Analysis Committee) and Dr. Lawrence Smarr (Chair of the Information Technology Infrastructure Committee), were unable to attend due to medical procedures. Mr. Lars Perkins, Interim Chair of the Education and Public Outreach Committee, will be representing Mr. Miles O'Brien, who is on a leave of absence from the Council until July 15, 2011. At Dr. Ford's request, the Council members introduced themselves.

Welcome to NASA Glenn Research Center

Dr. Ford introduced Mr. Ramon "Ray" Lugo, Director, NASA GRC. Mr. Lugo welcomed the Council members. He quoted GRC's Mission: "We drive research, technology, and systems to advance aviation, enable exploration of the universe, and improve life on Earth." GRC is located at Lewis Field in Cleveland, Ohio. GRC has 350 acres, 1646 civil servants and 1716 contractors. Its Plum Brook Station Test Site is located in Sandusky (about an hour away) and has 6500 acres, 16 civil servants and 140 contractors. He presented a chart showing GRC's senior management. GRC uses a Strategic Action Plan, which shows what the Center actually plans to do. Mr. Lugo discussed GRC's budget, workforce, economic impact, and educational grants program in Ohio. GRC has six core competencies: air-breathing propulsion; in-space propulsion and cryogenic fluids management; physical sciences and biomedical technologies in space; communications technology and development; power, energy storage and conversion; and materials and structures for extreme environments areas. Mr. Lugo described GRC's recent awards and recognitions. These include the Research and Development 100 awards (109 awards from 1966-2010), the NASA Software of the Year Award (5 GRC awards over the past 15 years), the Emmy Award for Communications, Presidential Rank Awards (16 Meritorious and 4 Distinguished from 2005-2010), Space Act Awards (244 awards in FY 2010), and Collier Awards (1 in 1988 and 1 in 2008). GRC was awarded 19 patents in FY 2009 - FY 2010. Mr. Lugo presented charts showing GRC's contributions to aeronautics, and he described GRC's current flight projects. GRC is actively pursuing the development of strategic

partnerships with industry, academia, and other government agencies and laboratories. Mr. Lugo described the success associated with relocating the NASA Glenn Visitor Center from GRC to the Great Lakes Science Center in downtown Cleveland. The Visitor Center now receives five times more visitors per year than when it was located on site. Mr. Lugo noted that many buildings at GRC are quite old and need to become more energy efficient. He presented a slide showing infrastructure transformation at GRC. In response to a question from Ms. Esther Dyson, he explained that GRC's biggest challenge is budget stability and the need for more clarity on what the mission will be.

Dr. Ford thanked Mr. Lugo for his presentation.

Plans for Development of Heavy Lift Launch Vehicle

Dr. Ford introduced Mr. Daniel Dumbacher, Special Assistant for Human Exploration Capabilities, Exploration Systems Mission Directorate (ESMD), NASA HQ, and noted that he is currently on detail from the NASA Marshall Space Flight Center (MSFC) in Huntsville, Alabama. Mr. Dumbacher explained that NASA is developing plans for exploration systems that are affordable, sustainable, and realistic. Consistent with direction in the NASA Authorization Act of 2010, NASA has selected a Reference Vehicle Design (RVD) for both the Space Launch System (SLS) and the Multi-Purpose Crew Vehicle (MPCV). This provides a baseline from which to start developing schedule, costs and requirements, as well as acquisition plans. NASA will continue to examine alternative designs and is preparing an SLS/MPCV Integrated Plan through a SLS/MPCV Integrated Analysis Process (IAP). Successful completion of the IAP will enable NASA to deliver a Congressionally-mandated report by late spring or early summer. Mr. Dumbacher described the overall strategy for completing the Integrated Plan. The SLS and MPCV are at very different maturity points. The SLS, MPCV, and supporting elements are coupled, so planning requires that the individual elements be considered in cycles. An independent cost assessment (ICA) will be conducted to improve confidence in budget requirements. Mr. Dumbacher presented a chart showing the milestones leading to an Integrated Plan. The next step calls for presenting final alternatives to the Agency and selecting a baseline for the ICA. Since a key goal is affordability, the ICA will be a "sanity check" and is part of NASA's due diligence. The ICA will inform, but not establish, the program budgets.

Alternative element studies will be performed to determine whether heritage systems would expedite the development process and whether alternatives would provide combined development and life cycle costs dramatically lower than the RVD. Three Requirement Analysis Cycle (RAC) Teams will create and study different design concepts. A fourth team will look at cross-cutting affordability. The Human Element Framework Team (HEFT) and Figures of Merit (FOM) studies were concluded in 2010 without architecture decisions. Thirteen Heavy Lift study contracts, at \$750,000 per contract, have been completed by interested contractors, and NASA is evaluating the results. In general, the contractors favored their individual business models; however, there were numerous innovative ideas. Three contractors provided detailed cost and configuration data that is being compared to the RAC study results.

A chart was presented showing three SLS concepts. The first concept, using LOX/H₂ architecture, is the RVD. The second and third concepts use LOX/RP and Modular architectures, respectively. Mr. Dumbacher reviewed a chart analyzing the strengths and weaknesses for each concept. In response to a question from Col. Eileen Collins, Mr. Dumbacher acknowledged that performance from a crew safety perspective could present a challenge for the third concept. He described the MPCV analysis approach. It seeks to evaluate whether the beyond-Low Earth Orbit (LEO) version of the Orion Crew Exploration Vehicle (the RVD) is the most effective approach. This requires validating whether the Orion requirements closely match MPCV requirements consistent with the Authorization Act, which requires using the MPCV as the primary crew transportation vehicle for beyond-LEO exploration, as well as being capable to serve as backup for International Space Station (ISS) crew and cargo transportation. In response to a question from Col. Collins, he explained that in the broad scope everything is aimed at satisfying the requirements for a mission to Mars. "Exploration" (beyond low Earth orbit) requirements are very different from those needed for a LEO to and from ISS, and it is not an easy comparison. A deep space mission is longer in duration and requires more cargo space, more propellant, more robust thermal protection, increased reliability, and more radiation shielding. Mr. Richard Kohrs opined that MPCV development might need to be put on hold if NASA pursues the block 2 alternative.

Mr. Dumbacher discussed the SLS/MPCV IAP. The goal is to explore the range of affordable, sustainable, and credible alternatives for developing beyond LEO exploration capability by integrating various SLS and MPCV options. Affordability will be treated as a gate, not as an attribute. The Mission Directorate will analyze the attributes for each integrated alternative to provide facts and data to NASA leadership for consideration. Five integrated options are currently being analyzed. Charts were reviewed evaluating the beyond LEO Exploration capability attributes. At Dr. Ford's request, Mr. Dumbacher discussed the rationale for direct entry from a Mars mission as opposed to capture in Earth orbit. The biggest problem is dissipating energy from the return flight. There are two options: dissipate the energy in the Earth's atmosphere, or stop at LEO and dissipate the energy propulsively. The weight for the additional propellant needed for the second option is greater than the weight for the additional shielding needed for the first option.

Dr. Ford thanked Mr. Dumbacher for an excellent presentation.

Technology and Innovation Committee Report

Dr. Ford introduced Ms. Esther Dyson, Chair, Technology and Innovation Committee. She reviewed the topics discussed by the Committee during its meeting at NASA HQ on April 28-29, 2011. She presented a chart showing the President's proposed FY 2012 Space Technology budget. At \$1.024 billion, it is approximately five percent of the President's \$18.7 billion Budget request for NASA. It includes \$284 million for the Small Business Innovation Research and Small Business Technology Transfer (SBIR/STTR) programs and related technology transfer and commercialization activities funded in FY 2010 through NASA's Innovative Partnership Program. It also includes moving \$310 million for a majority of the Exploration Technology Development and Demonstration activities, from ESMD. Ms. Dyson explained that the SBIR/STTR programs make grants to small business. A recent Office of Inspector General (OIG) audit report raised some questions on those grants and their administration. The primary problems are attributable to insufficient oversight and inadequate funds to perform site visits. Ms. Dyson described a recent Space Act Agreement between NASA and the Colorado Association of Manufacturing and Technology. This agreement was the result of people taking an initiative, rather than following a process. Ms. Dyson described the Innovation Ambassadors program, where NASA employees are nominated by their peers to participate in temporary developmental assignments with external host organizations for up to one year. She presented charts showing that NASA may not be effectively capturing civil servant innovation. She advised that the number of patents filed for by NASA is "pitiful." Each NASA Center has its own policies and procedures for pursuing patents. The Committee has decided to obtain a thorough understanding about NASA's intellectual property policy and strategy and to make any appropriate recommendations. Ms. Dyson presented a slide showing new innovations developed through the SBIR/STTR program. The NASA Innovative Advanced Concepts (NIAC) program was described. Its objective is early studies of visionary, long-term concepts. A slide was presented on the Flight Opportunities Program Funding.

Ms. Dyson described a recent interpretation on SBIR/STTR award severability by NASA senior staff that has led to significant delays in funding awardees. She presented for the Council's consideration a proposed recommendation to address those delays. After discussion, the Council approved the following recommendation:

Request that senior Agency leadership address issues surrounding the significant delays in FY 2010 and FY 2011 in funding SBIR/STTR awardees and work to remedy these problems for FY 2012 and beyond.

Ms. Dyson previewed the topics to be considered at the August 2011 Committee meeting.

Dr. Ford thanked Ms. Dyson for her presentation.

Space Operations Committee Report

Dr. Ford introduced Col. Eileen Collins, Chair, Space Operations Committee. She reviewed the Committee's recent activities. The members met with Mr. Robert Cabana, Kennedy Space Center (KSC) Director, and Mr. William Gerstenmaier, Associate Administrator for Space Operations Mission Directorate (SOMD), NASA HQ. They received briefings on the SOMD FY 2012 Budget, the 21st Century Launch Complex Status, the Commercial Crew Development Program, and SpaceX flight status. The Committee visited the Operations & Check Out Building, which will be the future home for Orion vehicle processing. They also visited the SpaceX launch complex and the Orbiter Processing Facility, where Discovery is being prepared for retirement at the Smithsonian Institution's National Air and Space Museum. Col. Collins described SOMD's budget priorities. Foremost is to safely fly the remaining Space Shuttle manifest. Other budget priorities are to ensure safety and viability for astronauts on the ISS and to support the U. S. commercial space industry efforts to provide safe, reliable and cost effective access to low Earth orbit. She described the current plans to merge SOMD with Exploration Systems Mission Directorate (ESMD) to create a new directorate that will implement the human spaceflight program in alignment with the goals set forth in the NASA Authorization Act of 2010. Two flights remain on the Space Shuttle Program Manifest: STS 134 and STS 135. Col. Collins briefly reviewed all manned and cargo flights planned to the ISS in FY 2011. Research on the ISS was addressed, and a chart describing ISS research statistics was presented. NASA will award a cooperative agreement to an independent non-profit organization (NPO) to help manage the ISS National Laboratory. The NPO will oversee all research involving organizations other than NASA. Col. Collins described plans for the 21st Century Space Launch Complex. Those plans, in accordance with the NASA Authorization Act of 2010, include upgrading the Florida launch range, expanding the ability to support SLS, MPCV, and commercial launch services providers, and transforming KSC into a modern facility that benefits a wide range of users. Two key concepts are to enable multi-use capability and to require stakeholders to offset vehicle unique requirement costs. She presented a chart showing the launch platforms that will be needed for various rockets.

Col. Collins described the Commercial Crew Program (CCP). She noted that the 2010 NASA Authorization Act established Commercial Crew as the primary means for ISS crew transportation. She presented the CCP's organization chart and noted that its staff comes from different Centers. It is managed by Mr. Edward Mango. The organization intends to remain small and avoid growing into a bureaucracy. The CCP's objective is to develop a U.S. commercial crew space transportation capability for achieving safe, reliable, and cost-effective access to and from LEO and the ISS by late 2016. The CCP will manage the Crew Transportation System (CTS). Four companies—Blue Origin, Boeing, Sierra Nevada, and SpaceX—have received awards under the second round of NASA's Commercial Crew Development effort (CCDev-2), which is intended to mature technologies and components for commercial crewed vehicles.

Col. Collins said that her Space Operations Committee had observed that the Commercial Crew Program's lean organizational approach to staffing is consistent with Agency goals for commercial programs, and that a good working relationship existed between the involved NASA Centers. She noted that SpaceX has proposed combining two demonstration flights: Flight 2 (approach and rendezvous, no berthing) and Flight 3 (rendezvous and berthing to the ISS). NASA has given tentative approval to study the proposal and the Space Operations Committee is satisfied with the process that has been followed.

Col. Collins presented for the Council's consideration a proposed Finding on inefficiencies and benefits related to a human space flight mission. After discussion, the Council approved the following Finding:

The Council was impressed with the way Program and Center officials are dealing with the current budget environment; however, the lack of a well-defined human spaceflight mission beyond low Earth orbit appears to be creating inefficiencies in the way that limited budget dollars are being spent. We believe that a focused mission with a specific end objective, as has been the case for over 50 years, would also greatly benefit the NASA workforce, current and future domestic and international partners, and the general public.

Col. Collins presented for the Council's consideration a proposed Recommendation on the need for NASA's websites to convey consistent information regarding human exploration programs. After discussion, the Council approved the following Recommendation:

NASA websites convey mixed and inconsistent messages about the future direction of human exploration programs. The website needs to be reviewed and changed to ensure that the messages about the future direction of human exploration are consistent.

Col. Collins complemented the Space Shuttle workforce. She noted that not as many contractor employees have left the program early as had been previously feared. Col. Collins noted that it has been reported that the workforce has remained with the Program because they want to see it to its completion. She anticipates a visible negative effect on the local economy approximately six months after the last launch. The Shuttle operations team is currently operating at a peak level of performance and it is unfortunate that so many technical skills will be lost after the next round of layoffs. She expressed hope that the country will be able to focus on what is next for human space flight upon a safe and efficient conclusion to the two remaining Shuttle flights.

Dr. Ford thanked Col. Collins for an excellent presentation.

Science Committee Report

Dr. Ford introduced Dr. Wesley Huntress, Chair, Science Committee. The Committee has a new member: Dr. Scott Hubbard from Stanford University. Dr. Huntress noted that the Science Mission Directorate (SMD) has a new *YouTube* channel hosting short science videos. It can be found at: <http://www.youtube.com/user/ScienceAtNasa>.

Dr. Huntress described some recent science results. The Stratospheric Observatory for Infrared Astronomy (SOFIA) has completed its second flight series. NASA's several Heliophysics spacecraft have observed the strongest solar flare since 2006. Voyager 1 performed a remotely controlled maneuver 21 years after its last maneuver. It now has a new aim point for heliospheric measurements. The MErcury Surface Space Environment GEochemistry and Ranging (MESSENGER) is the first spacecraft to orbit Mercury and will map the planet's surface globally. MESSENGER is expected to acquire over 75,000 images in its one-year mission. The Stardust spacecraft encountered the comet Tempel-1 on February 14, 2011, making Tempel-1 the first comet ever visited twice.

Dr. Huntress discussed several programmatic issues. The James Webb Space Telescope (JWST) is progressing despite budget issues and re-planning activities. The Glory spacecraft failed to reach orbit after liftoff aboard a Taurus XL rocket on March 4, 2011. The failure is similar to one that occurred last year. A chart was presented showing SMD missions scheduled to launch later in calendar year 2011. These include Aquarius, which is an Argentina spacecraft, and the Mars Science Laboratory (MSL). There is a launch vehicle crisis. NASA is losing reliable, predictable and affordable access to space via proven launch vehicles. After two consecutive failures of the Taurus-XL, there is no certified U.S. launch vehicle with capacity between the Pegasus and the Atlas-V. A chart listing the U.S. launch vehicles was presented. Dr. Huntress reviewed SMD's FY 2012 proposed budget and notional programmatic estimates through FY 2016. He discussed the budget's impact on SMD. Planetary Science will not be able to fulfill the recommendations in the current National Research Council (NRC) Planetary Decadal Reports without reducing Flagship mission objectives. Earth Science will lose half of the Climate Initiative. The cost for JWST will increase and its launch will be delayed. Renegotiations with the European Space Agency (ESA) will be required because some NASA contributions will be reduced and others terminated. SMD is restructuring its programs to meet the new budget challenge; however, it is clear that much science will be lost in the coming years.

Dr. Huntress presented for the Council's consideration a proposed Finding on the losses to science in the FY 2012 proposed budget. The Council approved the Finding as follows:

The Administration's FY 2012 budget proposes a significant reduction in the five-year run-out of the NASA Earth & Space Science Program relative to the FY 2011 budget. This reduction puts at serious risk NASA's ability to accomplish the goals set out in several recent Decadal Surveys for Earth and space science, undermines the Science Mission Directorate's (SMD) international collaborations, and threatens the health of the Earth and space science enterprise.

Dr. Huntress presented for the Council's consideration a proposed Finding on the impact that NASA Procedural Requirement (NPR) 7120.5 has on costs for small and medium missions. He noted that it requires an excessive number of unproductive review cycles. Mr. Kohrs noted that ESMD is looking at the same problem. The Council approved the Finding as follows:

Small and medium missions, which comprise a major element of the Science Mission Directorate (SMD) portfolio, are increasingly less affordable. Lower cost flight missions require prudent but less conservative mission assurance and review processes than flagship missions. A return to affordable missions requires, in part, that NASA tailor NASA Policy Directive (NPD) 7120.5 for lower cost SMD mission categories and instill this tailoring into the engineering (technical, management, cost and other factors – i.e., TMC0) review process.

Dr. Huntress presented for the Council's consideration a proposed Recommendation on lowering the cost for expendable launch services. The Council approved the Recommendation as follows:

We recommend that NASA work aggressively to lower the cost of expendable launch services through whatever means possible. This may include block buys or other innovative approaches in the NASA Launch Services II (NLS II) contract, and pursuing alternate sources such as new commercial entries and international collaborations.

Dr. Huntress presented for the Council's consideration a proposed Recommendation on reacquiring reliable and affordable mid-range launch vehicle services. Dr. Charles Kennel noted that the Space Studies Board (SSB) had discussed this and the previous recommendation at its last meeting and would favor them. The Council approved the Recommendation as follows:

The Council recommends that NASA take urgent action to re-acquire reliable and affordable mid-range launch vehicle services (Taurus-XL to Delta II class) to enable access to space by its Earth and space science flight missions.

Dr. Ford thanked Dr. Huntress for an excellent presentation and took the opportunity to note that this date marks the 50th anniversary for Astronaut Alan Shepard's flight.

Information Technology Infrastructure Committee Update

Dr. Ford announced that there would be no report from the IT Infrastructure Committee due to Dr. Smarr's absence.

Commercial Space Committee Report

Dr. Ford introduced Mr. Brett Alexander, Chair, Commercial Space Committee. Mr. Alexander noted that Committee Member J. Michael Lounge, a former NASA Astronaut, had recently passed away. Mr. Alexander briefed the Council on Commercial Orbital Transportation Services (COTS). The original Space Act Agreements have been modified for both SpaceX and Orbital to add new milestones. SpaceX has completed 23 of 29 milestones and received payments from NASA totaling \$283 million. SpaceX became the first private company, in partnership with NASA, to successfully orbit and recover a spacecraft—the Dragon spacecraft. NASA is evaluating SpaceX's proposal to combine flight demonstration number two with flight demonstration number three. DragonEye II was launched on STS-133. Orbital has completed 18 of 29 milestones and received payments from NASA totaling \$197.5 million. Mr. Alexander presented milestone charts for both companies and opined that the slippage shown was acceptable. He described the status of the Commercial Crew Program (CCP). He noted that the NASA Authorization Bill of 2010

established Commercial Crew as the “primary means” for transporting NASA astronauts to and from the ISS. Four companies were recently awarded a total of \$269 million under the second phase of the Commercial Crew Development 2 (CCDev2) program: Blue Origin, Boeing, Sierra Nevada, and SpaceX. The funds are to be used for “significant maturation of commercial crew systems.” Human rating requirements were recently released. Col. Collins asked whether Orbital had been interested in participating in the commercial crew launch program. Mr. Alexander explained that Orbital had proposed a pressurized container that was not adaptable for crew. Orbital did submit a proposal in CCDev 2; however, that proposal was not accepted by NASA.

The Committee had no findings, observations, or recommendations at this time.

Dr. Ford thanked Mr. Alexander for his presentation.

Education and Public Outreach Committee Report

Dr. Ford introduced Mr. Lars Perkins, Interim Chair, Education and Public Outreach (EPO) Committee (filling in for Mr. Miles O'Brien, who is on a temporary leave of absence). Mr. Perkins began by noting that Mr. O'Brien would return from his leave of absence for the next Council meeting. Mr. Perkins described the Committee activities since its last meeting. The members visited the SBIR with the Technology and Innovation Committee in February 2011. In April 2011, he participated on an ISS panel at the Coalition for Space Exploration (CSE) meeting in Colorado. The panel focused on the how the ISS story will replace the Shuttle story.

Mr. Perkins described the FIRST (For Inspiration and Recognition of Science and Technology) Robotics Competition, which is celebrating its 20-year anniversary. It is part of the NASA Robotics Alliance Project. NASA sponsors 312 teams. FIRST began with 28 teams in a New Hampshire high-school gym and, today, is reaching close to 250,000 young people from ages six to eighteen. Ms. Marion Blakey described as “ingenious” the decision to have FIRST’s annual championship take place in a sports stadium. A video entitled “*I don't need a gang anymore, I have NASA*” about FIRST and its founder, Mr. Dean Kamen, was shown and can be seen at <http://bit.ly/m3NkuQ>. FIRST’s annual budget is approximately \$30 million and \$15 million comes from donations. The program is very relevant to NASA. Every team is provided with Labview software and the participants learn to program in that language. FIRST emphasizes the word “inspiration.” Students who participate in FIRST are twice as likely to major in science or engineering than non-participants. SMD plans to continue supporting the program and sponsor over 300 FIRST teams in FY 2011. FIRST works because its resources are amplified by volunteer efforts and partnerships. Engineers and mentors from every NASA Center assist.

Mr. Perkins discussed STEM education and lamented the relatively small number of incoming freshmen who choose to major in science or engineering. NASA’s FY 2012 proposed education budget is \$138 million, and \$40 million is returned to the states in the form of grants. The question is what to do with the remaining \$98 million. Mr. Perkins believes that the FIRST (robotics program) model is ten times more cost-effective than programs designed from the top down. He observed that NASA’s core competency is not “education,” it is “science, engineering and inspiration.” He believes that NASA should let scientists educate by inspiring students. Mr. Perkins reviewed and endorsed the recommendations made by Mr. Leland D. Melvin, NASA’s Associate Administrator for Education. These include focusing NASA’s education programs, strategically managing partnerships, participating in State/National STEM (science, technology, engineering and math) discussions, and improving communication.

Mr. Perkins discussed NASA’s efforts at public outreach. He likened NASA’s new Mission Statement to a camel: a horse made by a committee. He asserted that effective public messaging needs to be clear, concise, consistent, and contextual. There should be no more than three messages and the messages must be relentlessly repeated. He presented another video entitled “Increase the Awesome,” which was created by a private individual and is available at <http://bit.ly/IO3ugk>. Ms. Dyson noted that the NASA Mission Statement appeared vague compared to the video presentation. Dr. Kennel suggested thinking about transferring inspiration in addition to transferring technology.

Dr. Ford thanked Mr. Perkins for the presentation and for his service as acting chair of the Education Public Outreach Committee during Miles O'Brien's absence. The Council applauded him for his service.

Audit, Finance and Analysis Committee Report

Dr. Ford introduced the Hon. Michael Montelongo, Vice Chair, Audit, Finance and Analysis Committee. The Committee chair, Mr. Robert Hanisee, was unable to attend due to medical reasons. Mr. Montelongo described the Committee's activities at its last meeting. They were briefed on NASA's new Strategic Plan, NASA's FY 2012 Proposed Budget, NASA's new auditor, the NASA Office of Inspector General (OIG) audits, unfunded environmental liabilities (UEL), and the General Accounting Office (GAO) Quick Look Book (QLB).

A new NASA Strategic Plan was released by NASA in February 2011. It contains six strategic goals: (1) extend and sustain human activities across the solar system; (2) expand scientific understanding of the Earth and the universe in which we live; (3) create innovative new space technologies; (4) advance aeronautics research for societal benefit; (5) enable program and institutional capabilities to conduct NASA's aeronautics and space activities; and (6) share NASA with the public, educators, and students to provide opportunities to participate in its mission, foster innovation, and contribute to a strong national economy. The new Strategic Plan retains the Agency's existing core values introduced in the 2008 Governance and Strategic Management Handbook (NPD 1000.0A), including: safety, integrity, teamwork, and excellence. The Strategic Plan introduces overarching strategies for Agency alignment with major Administrative initiatives for investing in next-generation technologies, inspiring students, expanding partnerships, committing to environmental stewardship, and securing the public trust through transparency and accountability. Mr. Montelongo described the strategic planning requirements found in the Government Performance and Results Modernization Act of 2010 (GPRAMA). He reviewed the GPRAMA requirements for Agency performance leadership. There is to be a Chief Operating Officer (COO), who must be a Deputy Agency Head with responsibilities to improve Agency management and performance. For NASA, this will be Mr. Christopher Scolese, Associate Administrator. There is to be a Public Improvement Officer (PIO), with responsibilities for implementing the GPRAMA agency requirements. For NASA, this will be Dr. Elizabeth Robinson, Chief Financial Officer. Activities that fail to meet strategic goals are required to produce corrective action plans. Long-term strategies must relate to short-term activities.

Mr. Montelongo presented charts on the FY 2012 Budget request and on the FY 2011 Annual Performance Goals (APG) self-assessments which will be updated after NASA completes its FY 2011 operating plan. He noted that Price Waterhouse Coopers (PwC) has succeeded Ernst & Young as NASA's financial statement auditor. PwC has committed to ensure that potential issues are shared early to prevent surprises. PwC's top-down, risk-based audit approach was described. Mr. Montelongo briefly reviewed PwC's areas of emphasis and timeframe for executing the audit. He next described planned NASA OIG audit projects. The OIG is shifting from an emphasis on compliance audits to a greater focus on program and performance audits. The performance audits will include auditing NASA's project management practices, NASA's planning and budgeting for construction projects, and NASA's grant administration and management. UEL will continue to be examined. Refinements will be made to the UEL estimating processes and additional disclosure categories are planned. NASA will work closely with PwC to ensure a mutual understanding on the UEL issues. Mr. Montelongo finally discussed the GAO's Quicklook Book (QLB) Audit. This is a Congressionally-mandated, ongoing annual audit on NASA's major programs, projects, and activities. It covers efforts by six Centers, three Mission Directorates, and many key HQ functional offices. Mr. Montelongo summarized the GAO QLB issues from 2008 through 2010. The QLB does not present findings or recommendations. The GAO did, however, issue a February 10, 2011, "Management Letter" with recommendations based on the QLB audit. In the letter, the GAO issued recommendations addressing the lack of transparency into early project development costs, and the lack of a design metric, which may be contributing to project cost growth. NASA has responded to these recommendations.

The Committee had no specific observations, findings, or recommendations. Dr. Kennel expressed discomfort over the OIG plan to review NASA research grants to determine if goals are being achieved. He

explained that he tells his students that if they knew what they were doing it would not be called research. He expressed concern that the new process could be discouraging. Mr. Montelongo acknowledged Dr. Kennel's concern saying he would take it back to the Committee.

Dr. Ford thanked Mr. Montelongo for his presentation.

Public Input

Dr. Ford gave the public an opportunity to comment. There were no comments.

The meeting was adjourned for the day.

Friday, May 6, 2011

Call to Order

Ms. Rausch called the meeting to order.

Announcements

Dr. Ford welcomed the Council Members back for the second day of the NAC meeting. He described the agenda for the day and reviewed the presentations from the previous day. He conveyed appreciation to the members for their participation from NASA's Administrator, Mr. Charles Bolden.

Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era

Dr. Ford introduced Dr. Wendy Kohrt, Professor of Medicine at the University of Colorado, Denver. Dr. Kohrt served as the co-chair for the National Academy of Sciences (NAS) 2010 NRC SSB decadal survey on life and microgravity sciences. This decadal survey, entitled "*Recapturing a Future for Space Exploration: Life and Physical Sciences Research for a New Era*," is an important document that sets forth the priorities in those space research areas for the U.S. scientific community for the next 10 years. The decadal survey is available on the Internet and can be found at: http://sites.nationalacademies.org/SSB/CurrentProjects/ssb_050845.

The NRC's decadal survey defines the next decade for a science-based program that addresses, in an integrated fashion, plant and microbial biology, behavior and mental health, animal and human biology, cost-cutting issues for humans in the space environment, fundamental physical sciences in space, applying physical sciences in space, and translation to space exploration systems. Metrics were developed for prioritizing this research and for creating timelines appropriate to policy decisions. The survey recommends an integrated life and physical sciences research portfolio that identifies facility and platform requirements and is adaptable to changes in policy and budget. Dr. Kohrt reviewed the steering committee, staff, and panels responsible for the decadal survey. There was deep concern about the state of NASA's life and physical sciences research. They believe that a focused science and engineering program can achieve successes that will bring everyone to an understanding that the country is ready for the next significant phase of human space exploration. The goal is to lay out steps whereby NASA can reinvigorate its partnership with the life and physical sciences research community and develop a forward-looking portfolio for research that will provide the basis for recapturing the excitement and value from human spaceflight in order to return the U.S. to the forefront of space exploration.

One common theme that arose repeatedly concerned programmatic barriers to establishing a successful research program. These barriers were considered to be at least equal in importance to the selection of research. Dr. Kohrt reviewed the programmatic issues that were identified. They include: elevating as a priority life and physical sciences research in space exploration; establishing a stable and sufficient funding base; improving the process for solicitation; rejuvenating the intellectual capital pipeline; and developing commercial sector interactions. Also included is providing administrative oversight at a sufficiently high

level at NASA to ensure a “voice at the table” when the Agency deliberates prioritizing resources, and exercising influence within mission planning elements.

Dr. Kohrt described the highest priority research recommendations for each discipline covered by the decadal survey. She presented charts that summarized and prioritized the recommendations.

Ms. Dyson opined that having someone involved in the process at a high level is more important than more review panels and committees. Dr. Kennel expressed concern that there is no home within NASA’s organization for a program that NASA is counting on to provide some of the main results from the extended ISS. There is a requirement for stability of purpose that must involve both the inside and outside community. Dr. Kohrt counseled that the external scientific community is discontented, cynical, and skeptical. Dr. Ford noted that the sense of disappointment in the external research community cuts across nearly every discipline that NASA funds, particularly in life and physical sciences research and in technology. Research programs seem to capriciously come and go and are often used as “banks” that are depleted whenever there are budget cuts. This makes the research communities reluctant to build laboratories, employ students, and plan a future on something that may only last a year or two and then disappear. Dr. Kennel observed that in Europe there is an extensive ISS research program that has been stable for 12 years. They have developed a large university consortium to exploit the access to space on the ISS. They have a different perception about what the Space Station does. Their model is a national laboratory. It is not a mission or a succession of small experiments; it is a program where research in low gravity is encouraged, and that has led to respectable participation by the research community.

Dr. Ford asked whether a research priority had been identified for intracranial pressure and vision problems for astronauts, noting that area has become “worrisome.” Dr. Kohrt responded that this subject did not receive as much attention as it deserves. Dr. Kohrt provided examples on how prioritization mapping would work. She explained that the 2002 NASA budget for life and physical science research was approximately \$500 million. Dr. Huntress noted that this area had its own directorate in the 1990’s and that its budget had been eroded in order to fund the ISS. Dr. Kennel opined that the most valuable aspect to the ISS is the international partnership that built it. He explained that an international effort would be needed to go to Mars, and he expressed concern that the international partnership would need to be re-created if the ISS was abandoned. Col. Collins described how privacy concerns have adversely affected using data obtained from medical tests on astronauts. Dr. Kohrt asserted that having those data available is at least as important as protecting one person’s confidentiality. It is a risk, as is going into space a risk. Dr. Ford concurred.

Dr. Ford thanked Dr. Kohrt for her excellent presentation.

Exploration Committee Report

Dr. Ford introduced Mr. Richard Kohrs, Chair, Exploration Committee. He described the Committee’s activities at its last meeting. The members received an update on the Exploration and Commercial Programs from Mr. Douglas Cooke. Dr. Elizabeth Cantwell briefed them on the NRC’s Life and Physical Sciences Research decadal survey. Mr. Kohrs advised the Council that ESMD and SOMD were merging into one organization. A new division, Exploration Systems Development (ESD) will be headed by Mr. Dumbacher. Mr. Cooke has announced his retirement. Mr. Kohrs discussed the current concepts for the Space Launch System (SLS). There are three configuration options: LOX/H₂, which is the Reference Vehicle Design (RVD); LOX/RP; and Modular. Whichever configuration is used, NASA will need to soon begin developing a new high-performance engine. The Council discussed the relative cost and reliability for the different configurations (including Space Shuttle Main Engines). Mr. Alexander noted that the Senate has fixed three points: time, money and design. Ms. Dyson observed that the Senate language forces NASA to make promises that may not be able to deliver. Mr. Kohrs counseled that NASA’s budget will not support going beyond low Earth orbit (LEO), and that international partners will be needed if the ultimate goal is to get to Mars. He reviewed the Global Exploration Roadmap. It is a tool developed by international space agencies to facilitate enhanced coordination and cooperation for global human space exploration.

Mr. Kohrs presented for the Council's consideration a proposed Observation on the feasibility of developing SLS by 2016 if a block approach is used and procurement actions are initiated promptly. The Council approved the Observation, which reads as follows:

The only feasible way of achieving initial heavy lift launch capability by 2016 is by using a reference design block approach to development of SLS and to initiate procurement actions promptly. Carefully planned evolution from Block 1 to Block 2 and ultimately to 130MT + Block 3 is required to ensure cost effective transition through these Blocks while minimizing overall cost of the SLS Program.

Mr. Kohrs presented for the Council's consideration a proposed Recommendation on developing SLS by 2016 with assistance from a competent integration contractor. He explained that NASA has not done well when the integration contractor was not a prime contractor and lacked urgency in getting the job accomplished. The Council approved the Recommendation, which reads as follows:

NASA should engage a competent integration contractor immediately in order to define induced environments (loads, vibro-acoustics, and thermal) and propulsion system parameters (propellant flow rates, engine pressure requirements, and required ullage pressures) that envelope design conditions for all 3 Blocks. These enveloped design conditions can then be used to size flight hardware that can be common to all 3 Blocks.

Mr. Kohrs presented for the Council's consideration a proposed Recommendation for a new expendable main engine. After discussion, the Council approved the Recommendation to read as follows:

NASA should promptly start development of a new expendable main engine by a U.S. contractor that will supply sufficient power to support a 130 MT or a greater launch vehicle capability. This new engine must support a launch vehicle schedule consistent with the need of the 130 MT launch vehicle schedule.

Mr. Kohrs presented for the Council's consideration a proposed Recommendation on maintaining the industrial base that supports engine production. Ms. Blakey observed that this is a huge problem in the Defense Department and reaches across the entire industrial base. The Council approved the Recommendation, which reads as follows:

The Council strongly urges that NASA work expeditiously and visibly to ensure that the industrial base supporting engine production and development is sustained and enhanced.

Mr. Kohrs presented for the Council's consideration a proposed Observation on the Decadal Survey on Biological and Physical Sciences in Space. The Council approved the Observation, which reads as follows:

The Council received a briefing on the Decadal Survey on Biological and Physical Sciences presented by Dr. Wendy M. Kohrt of the University of Colorado/Denver. The Council was impressed by the scope, depth and value of this extensive and detailed analysis of the state of the biological and physical sciences in space, and within NASA in particular.

The Council noted especially the value of Table 13.2 in the study, which identified the recommended research priorities for the physical and life sciences for each of eight strategic priorities that might form the basis for additional research in these areas. In essence, this matrix provides a "road map" for research that is guided by strategy, a particularly helpful approach that could inform both broad policy decisions and specific action agendas for funding agencies, NASA and related governmental agencies.

The Council also noted that radiation did not receive a prominence in the report because the study specifically pointed out that radiation had received detailed attention in separate reports prepared by the National Academies. Further, it noted that the study charter specifically excluded detailed budget planning from the purview of this study group.

Mr. Kohrs presented for the Council's consideration a proposed Recommendation that NASA appoint an Associate Administrator for the Life and Physical Sciences. The Council approved the Recommendation to read as follows:

NASA should appoint an Associate Administrator for the Life and Physical Sciences, charged with appropriate responsibilities and authority to ensure that integrated, coordinated and sufficient approaches to these areas are achieved in order to support the needs for future human space exploration, and to foster science developments that further the Nation's role as a leader in space-related science.

Mr. Kohrs presented for the Council's consideration a proposed Finding that supports the initiative on the Global Exploration Roadmap. Dr. Ford observed that this is a difficult subject and should consider the U.S. decision making process. After discussion, the Council approved the following Finding:

NASA's budget presently does not allow the Capabilities Architecture as currently defined to be implemented without international and interagency participation. The initiative on the Global Exploration Roadmap is a good platform for these discussions. We encourage them to continue these discussions and to begin to be more specific.

Dr. Ford thanked Mr. Kohrs for his presentation.

Aeronautics Committee Report

Dr. Ford introduced Ms. Marion Blakey, Chair, Aeronautics Committee. She described the topics covered at the Committee's last meeting held at NASA Dryden Flight Research Center (DFRC), which was an excellent host. The Committee was briefed on the Aeronautics budget, Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS), green aviation research, and Air-Traffic Management Technology. The Committee has two new members: Dr. John Langford and Mr. John Borghese. Ms. Blakey briefly described the X-48 Blended Wing Body (BWB). She discussed areas in which the Aeronautics Research Mission Directorate (ARMD) will increase research beginning in FY 2012. Ms. Blakey explained that ARMD's hypersonics research has been reduced to focus on goals outlined in the National Aeronautics Research and Development Plan. The research will be in areas where NASA possesses unique competencies. She provided an update on UAS in the NAS. NASA and the Joint Planning and Development Office (JPDO) are developing a research, development, and demonstration (RD&D) roadmap for UAS access to the NAS. The RD&D roadmap will provide the foundation for a technology roadmap for the overall National Roadmap for UAS access into the NAS and NextGen.

Ms. Blakey presented for the Council's consideration a proposed Observation and Recommendation on the UAS integration into the NAS interagency roadmap. The Council approved the following Observation:

In response to a request from the Office of Management and Budget (OMB), NASA is working with other Joint Planning and Development Office (JPDO) agencies to develop a research, development and demonstration (RD&D) roadmap to provide the foundation for a technology roadmap necessary for the overall National Plan for UAS access to the NAS. The Council supports and encourages the ongoing work being conducted by NASA to support the JPDO and the Federal Aviation Administration (FAA) in the development of an interagency RD&D roadmap. NASA is also working with FAA and key stakeholders to define success and to ensure that a National Plan is created which includes (at a minimum) policy, procedures, and technology.

The Council also approved the following Recommendation concerning UAS integration into the NAS interagency roadmap:

The Council recommends that NASA, as a member agency of the Joint Planning and Development Office (JPDO), ensure that the research, development and demonstration (RD&D) interagency roadmap activity include clear documentation on ongoing and future activities currently funded across the Government departments and agencies relating to UAS RD&D. In addition to supporting the deliverable to the Office of Management and Budget (OMB), the Council also recommends that NASA includes data about

international research programs on UASs in its own planning to augment its own research considerations, even if not submitted in the report to OMB.

Ms. Blakey described a new UAS Subcommittee within the Aeronautics Committee that will be led by Dr. Langford. The Subcommittee will provide advice on the UAS integration into the NAS project, provide advice when technical problems arise in the project plan, and provide advice on cooperating with UAS stakeholders. She described new laminar flow technology that is considered “green” aviation research because it is helping to meet fuel burn reduction goals. Ms. Blakey presented several charts on air-traffic management integrated technology demonstrations. OMB and Congress have requested NASA to accelerate air traffic management (ATM) technology transition, including Automatic Dependent Surveillance-Broadcast (ADS-B). NASA has also been asked to conduct more relevant flight research emphasizing and enhancing aviation safety and airspace efficiency.

Ms. Blakey presented for the Council’s consideration a proposed Observation endorsing the currently planned air-traffic management integrated technology demonstrations. In response to a question from Col. Collins, Ms. Blakey explained that there is no comprehensive plan for UAS testing in the U.S. Dr. Ford noted that the Air Force would like UASs to be able to operate in controlled airspace. After discussion, the Council approved the following as a Finding, rather an Observation:

The Council strongly endorses the air traffic management integrated technology demonstrations currently planned within the Airspace Systems Program. These activities will demonstrate the full potential of the Automatic Dependent Surveillance-Broadcast (ADS-B) functionality in the dense terminal area by integrating a critical set of technologies that NASA has developed and that are sufficiently mature for operational use. These activities expect to demonstrate significant savings in fuel consumption, flight time and reduced noise that would provide a strong financial incentive for operators to equip with ADS-B. This presents a major potential for NASA developed technologies to make a critical contribution to the accelerated implementation of ADS-B that is the backbone of the NextGen operating concept. The expected fuel savings would be achieved through more efficient flight paths and integrated NextGen capability for terminal operations, which will in turn increase throughput with ensured safety. The Council wants to underscore the importance of these activities and NASA’s approach in engaging both air- and ground-based communities in the effort. In addition, the Council hopes that NASA will calculate in some detail the fuel savings associated with the successful implementation of these technologies into the National Airspace System.

Dr. Ford thanked Ms. Blakey for her presentation.

NAC Work Plan for 2011

Dr. Ford noted that NASA is merging the Space Operations Mission Directorate and Exploration Systems Mission Directorate. The members of the respective Council Committees will remain with the successor Committee, which will be allowed to reduce in size from attrition. The August NAC meeting will be at the NASA Ames Research Center (ARC), where both Committees will meet in a joint session; afterward, the two will merge into a single Committee. All the NAC Committees will meet just prior to the Council meeting at ARC.

At Dr. Ford’s request, each Committee Chair described what his or her Committee would focus on in the months leading up to the ARC meeting. The Science Committee will be reviewing and advising on the restructuring that will be necessary due to budgetary uncertainties. It will respond as much as possible to the decadal report and examine how the report coupled with budget realities might impact international collaborations. The Technology and Innovation Committee will focus on intellectual property and licensing policies. Mr. Perkins explained that Mr. O’Brien will be transitioning back as Chair of the Education and Public Outreach Committee, and he will be working closely with Mr. Leland Melvin, Associate Administrator for Education, NASA HQ. The Exploration Committee will be working to provide advice to the Agency as it moves toward a heavy lift vehicle and the MPCV. It will also work to better understand the implications of the emerging budget on NASA’s ability to build these systems. The Space Operations Committee will examine the plan to manage the ISS National Laboratory through a non-profit organization

and also the training plan for NASA astronauts that will be flying under the Commercial Crew Program. Dr. Ford noted that the Council has a broad interest in the plan to have a non-profit organization manage the ISS National Laboratory that cuts across several committees. Ms. Dyson agreed and expressed a similar interest. Ms. Rausch will request a progress report on this activity from Mr. Mark Uhlan. The Commercial Space Committee will continue to look at Commercial Orbital Transportation Services (COTS), the Commercial Crew and Cargo Program, human rating, and service requirements from a business perspective. In addition, it will look at three new topics: suborbital commercial activities, hosted payloads, and the Innovative Lunar Demonstrations Data (ILDD) program, where NASA will purchase lunar data from commercial robotic flights to the moon. The Aeronautics Committee will review a new initiative on Verification and Validation (V&V), and will focus on the NASA Aeronautics Research Mission Directorate's international collaboration. It also will be looking at environmentally responsible aircraft.

Plans for Next NAC Meeting at NASA Ames Research Center, CA

Dr. Ford announced that the next Council meeting is scheduled for August 3-5, 2011, at ARC in California, which was where the first Council meeting was held two years ago. All nine Council Committees will be meeting on August 2, 2011, and may meet on August 1, if needed. The Committees may also meet on the morning of August 3, 2011. Joint Committee meetings may be held wherever it makes sense. This will start a tradition for an annual plenary meeting. There will be a dinner with Mr. Bolden for the Council Members on Wednesday (August 3). Thursday and Friday (August 4 and 5) will be the Council meeting and will be similar in format to the current Council meeting at GRC.

On Tuesday (August 2), in the late afternoon, there will be a plenary meeting with Mr. Bolden and all the Council Committees. Immediately following the meeting, the Committees and the Council will walk a short distance to a reception at ARC. Committee dinners would be a good idea for that night. Mr. Bolden may visit the individual Committees at their meetings. The Committees may make arrangements for separate tours of ARC.

The Fall Council meeting will be held November 2-4, 2011. The location remains to be determined.

Public Input

Dr. Ford gave the public an opportunity to make comments. There were no comments.

Adjournment

Dr. Ford thanked the NASA Advisory Council Members for their participation in the meeting. He thanked the Council's Executive Director, Ms. Diane Rausch, and the Council's support staff for their assistance. He expressed the Council's appreciation for the terrific hospitality from GRC.

The meeting was adjourned

NASA ADVISORY COUNCIL

**NASA Glenn Research Center
Ohio Aerospace Institute
President's Room – First Floor
22800 Cedar Point Road
Brook Park, Ohio**

**PUBLIC MEETING
May 5-6, 2011**

Agenda**Thursday, May 5, 2011**

8:00 – 8:05 am	Call to Order, Announcements	Ms. Diane Rausch, Executive Director NASA Advisory Council, NASA HQ
8:05 – 8:15 am	Remarks by Council Chair	Dr. Kenneth Ford, Chair NASA Advisory Council
8:15 – 9:10 am	Welcome to NASA Glenn Research Center	Mr. Ray Lugo, Director NASA Glenn Research Center
9:15 – 10:15 am	Plans for Development of Heavy Lift Launch Vehicle	Mr. Daniel Dumbacher Special Assistant for Human Exploration Capabilities Exploration Systems Mission Directorate NASA Headquarters
10:15 – 10:30 am	Break	
10:30 – 11:15 am	Technology and Innovation Committee Report	Ms. Esther Dyson, Chair
11:15 am – 12:00 pm	Space Operations Committee Report	Col. Eileen Collins, Chair
12:00 – 1:00 pm	Lunch (<i>Council members only</i>)	
1:00 – 1:45 pm	Science Committee Report	Dr. Wesley Huntress, Chair
1:45 – 1:50 pm	IT Infrastructure Committee Update	Dr. Kenneth Ford (for Dr. Lawrence Smarr, Chair)
1:50 – 2:35 pm	Commercial Space Committee Report	Mr. Brett Alexander, Chair
2:35 – 3:00 pm	Break	
3:00 – 3:45 pm	Education and Public Outreach Report	Mr. Lars Perkins, Interim Chair
3:45 – 4:30 pm	Audit, Finance and Analysis Committee Report	Mr. Michael Montelongo, Vice Chair (for Mr. Robert Hanisee, Chair)

4:30 – 5:00 pm Public Input

5:00 pm Adjourn

Friday, May 6, 2011

8:00 am Call to Order Ms. Diane Rausch, Executive Director
NASA Advisory Council

8:00 – 8:02 am Announcements Dr. Kenneth Ford, Chair
NASA Advisory Council

8:02 – 9:00 am Recapturing a Future for Space Exploration:
Life and Physical Sciences Research for a New Era Dr. Wendy Kohrt
Professor of Medicine
Department of Geriatric Medicine
University of Colorado Denver

9:00 – 9:45 am Exploration Committee Report Mr. Richard Kohrs, Chair

9:45 – 10:30 am Aeronautics Committee Report Ms. Marion Blakey, Chair

10:30 – 10:45 am Break

10:45 – 11:00 am NAC Work Plan for 2011 Dr. Kenneth Ford, Chair
NASA Advisory Council

11:00 – 11:30 am Plans for Next NAC Meeting at NASA
Ames Research Center, CA Dr. Kenneth Ford, Chair
NASA Advisory Council

11:30 am – 12:00 pm Public Input

12:00 pm Adjourn

12:00 – 1:00 pm Lunch (*Council members only*)

Public Dial-In Information:

May 5, 2011: From 8:00 am - 12:00 noon, and 1:00 - 5:00 pm

May 6, 2011: From 8:00 am - 12:00 noon

Toll Free Phone Number: (866) 702-6280

Meeting ID Number: 9658

NASA ADVISORY COUNCIL MEMBERS

May 2011

Role	Council Members
Chair – NASA Advisory Council	Dr. Kenneth M. Ford <i>Founder and Director, Florida Institute for Human and Machine Cognition</i>
Chair – Aeronautics Committee	The Honorable Marion Blakey <i>Chief Executive Officer, Aerospace Industries Association</i>
Chair – Audit, Finance, and Analysis Committee	Mr. Robert M. Hanisee, CFA <i>Managing Director, Trust Company of the West</i>
Chair – Commercial Space Committee	Mr. Brett Alexander <i>President, Commercial Spaceflight Federation</i>
Chair – Interim Education and Public Outreach Committee (<i>thru July 15, 2011</i>)	Mr. Lars Perkins
Chair – Exploration Committee	Mr. Richard Kohrs <i>NASA (Ret.)</i>
Chair – Information Technology Infrastructure Committee	Dr. Larry Smarr <i>University of California, San Diego</i>
Chair – Science Committee	Dr. Wesley T. Huntress, Jr. <i>Director Emeritus, Geophysical Laboratory, Carnegie Institute of Washington</i>
Chair – Space Operations Committee	Col. Eileen M. Collins <i>USAF (Ret.), NASA Shuttle Pilot and Commander (Ret.), Aerospace Consultant, President of Space Presentations, LLC</i>
Chair – Technology and Innovation Committee	Ms. Esther Dyson <i>EDventure Holdings</i>
Ex Officio Members	Dr. Charles F. Kennel <i>Chair, Space Studies Board, National Academies</i> Dr. Raymond S. Colladay <i>Chair, Aeronautics and Space Engineering Board, National Academies</i>

**NASA Advisory Council
Glenn Research Center
Ohio Aerospace Institute
Cleveland, Ohio
May 5-6, 2011**

MEETING ATTENDEES

NASA Advisory Council:

Ford, Kenneth, Chair	Director, IHMC
Rausch, P. Diane, Executive Director	NASA Headquarters
Alexander, Brett	Commercial Spaceflight Federation
Blakey, Marion	Aerospace Industries Association
Collins, Eileen	Space Presentations, LLC
Dyson, Esther	EDventure Holdings
Huntress, Wesley	Carnegie Institute of Washington
Kennel, Charles, Ex-Officio	Space Studies Board, National Academies
Kohrs, Richard	NASA (Ret.)
Montelongo, Michael (for Robert Hanisee)	Sodexo
Perkins, Lars	Entrepreneur

NASA Attendees:

Manthey, Lori	NASA/GRC
King, Marla	NASA HQ
Vick, Erika	NASA HQ
Keaton, Jacob	NASA HQ
Emond, John	NASA HQ
Shook, Joseph	NASA HQ
Siegel, Bette	NASA HQ
Dunbacher, Dan	NASA HQ
Minor, Susan	NASA HQ
Marinero, John	NASA/GRC
Cooke, Doug	NASA HQ

Other Attendees:

Frankel, David	P B Frankel, LLC
Schmadel, Kevin	Universities Space Research Association
Tarantino, Fred	Universities Space Research Association
Benge, John	Boeing
Reynolds, Jay	Cleveland State University
Kohrt, Wendy	University of Colorado/Denver

**NASA ADVISORY COUNCIL
Glenn Research Center
Ohio Aerospace Institute
Cleveland, Ohio
May 5-6, 2011**

LIST OF PRESENTATION MATERIAL

- 1) NASA Glenn Research Center Overview [Lugo]
- 2) Space Launch System/Multi-Purpose Crew Vehicle Status [Cooke]
- 3) Technology and Innovation Committee Report [Dyson]
- 4) Space Operations Committee [Collins]
- 5) Science Committee Report [Huntress]
- 6) Education & Public Outreach [Perkins]
- 7) Commercial Space Committee [Alexander]
- 8) Audit, Finance, and Analysis Committee [Montelongo]
- 9) Recapturing a Future for Space Exploration: Life and Physical Sciences Research in a New Era [Kohrt]
- 10) Exploration Committee Report [Kohrs]
- 11) Aeronautics Committee Report [Blakey]